

- Kozár, F., and A. Viktorin. 1978. Survey of scale insect (Homoptera: Coccoidea) infestations in European orchards. Changes in the scale infestation levels in Hungarian orchards between 1971 and 1976. *Acta Phytopathologica Academiae Scientiarum Hungariae* 13:391-402.
- Madsen, B.J. and C.V.G. Morgan. 1975. Mites and insects collected from vineyards in the Okanagan and Similkameen valleys, British Columbia. *J. Entomol. Soc. Brit. Columb.* 72:9-14.
- McKenzie, H.L. 1967. Mealybugs of California. University of California Press, Berkeley and Los Angeles, 526 pp.
- Miller, D.R. 1975. A revision of the genus *Heterococcus* Ferris with a diagnosis of *Brevennia* Goux (Homoptera: Coccoidea: Pseudococcidae). U.S. Dept. Agr. Tech. Bull. 1497, 61 pp.
- Morrison, H. 1925. Classification of scale insects of the subfamily Ortheziinae. *Jour. Agr. Res.* 30:97-154.
- _____. 1952. Classification of the Ortheziidae. Supplement to "Classification of scale insects of the subfamily Ortheziinae". U.S. Dept. Agr. Tech. Bull. 1052, 80 pp.
- Richards, W.R. 1958. Identities of species of *Lecanium* Burmeister in Canada (Homoptera: Coccoidea). *Can. Ent.* 90:305-313.
- Rubin, A.Y. and B.P. Beirne. 1975. The European fruit lecanium, *Lecanium tiliae* (L.) (Homoptera:Coccidae), in southwestern British Columbia. *J. Entomol. Soc. Brit. Columb.* 72:18-20.
- Scoggin, H.J. 1978a. The flora of Canada Part 2- Pteridophyta Gymnospermae Monocotyledoneae. *Nat'l.Mus.Nat.Sci., Ottawa. Pub. Bot. No. 7(2):93-545.*
- _____. 1978b. The flora of Canada Part 3- Dicotyledoneae (Saururaceae to Violaceae). *Nat'l.Mus.Nat.Sci., Ottawa. Pub. Bot. No.7 (3):547-1115.*
- _____. 1979. The flora of Canada Part 4- Dicotyledoneae (Loasaceae to Compositae). *Nat'l.Mus.Nat.Sci., Ottawa. Pub. Bot. No. 7(4):1117-1711.*
- Scudder, G.G.E. 1979. Hemiptera. In: Danks, H.V. (Ed.) *Canada and its insect fauna. Memoirs of the Entomological Society of Canada No. 108:329-348.*
- Venables, E.P. 1939. The scale insects of British Columbia. *Proc. Ent. Soc. Br. Columbia.* 35:23-24.
- Waddell, D.B. 1952. A preliminary list of the Hemiptera of the Kootenay Valley. *Proc. Ent. Soc. Br. Columbia.* 48:93-96.
- Williams, D.J. 1985. The British and some other European Eriococcidae (Homoptera: Coccoidea). *Bulletin of the British Museum (Natural History) Entomology Series* 51(4):347-393.
- Williams, D.J., B.W. Blair and S. Khasimuddin. 1985. *Phenacoccus solani* Ferris infesting tobacco in Zimbabwe (Homoptera, Coccoidea, Pseudococcidae). *Entomol. Mon. Mag.* 121:87-88.

NEW RECORDS OF SLENDER WINTER STONEFLIES (PLECOPTERA: CAPNIIDAE) IN BRITISH COLUMBIA

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ABSTRACT

Distribution data for 15 species of Capniidae are presented, supplementing the annotated checklist of Ricker and Scudder (1975). Five species (*Bolshecapnia milami*, *Capnia coloradensis*, *C. petila*, *C. sextuberculata* and *Utacapnia trava*) are reported from British Columbia for the first time.

INTRODUCTION

Since the publication of Ricker and Scudder's (1975) annotated checklist of the Plecoptera of British Columbia, knowledge of the local distribution of the slender winter stoneflies (Capniidae) has increased considerably. Ricker (1943) documented the occurrence of many valley inhabiting species in southwestern British Columbia, but made few visits to higher altitudes during the winter and early spring. In recent years many collections have been made in these habitats, especially in the southern part of the province. However, the central and northern sections of the province remain largely *terra incognita*, although recent collecting in the Yukon allows some interpolation of range information. The following data are largely the result of collections made by myself and colleagues; these specimens are in the Spencer Entomological Museum, University of British Columbia. However, collections in Rocky Mountain parks made by D.B. Donald and R.S. Anderson of the Canadian Wildlife Service are also included; the lentic stoneflies of these collections were reported in a summary fashion in Donald and Anderson (1980). These specimens are in the collections of the Canadian Wildlife Service, Edmonton, Alberta.

NOMENCLATURE

The nomenclature follows Zwick (1973) and differs from that of Ricker and Scudder (1975) in the recognition of *Mesocapnia* and *Utacapnia* as separate genera, rather than as subgenera of *Capnia*. Ricker and Scudder also treated *C. gracilaria* as *C. promota* Frison.

SPECIES LIST

This list includes only those records that extend or fill in gaps in ranges as indicated by the list of Ricker and Scudder (1975). Many records in the following list are from E.C. Manning Provincial Park, which is therefore abbreviated (MPP) following the initial record. Each record is followed by the collector's name or initials in parentheses. The key to initials is as follows: H&AB – Hugh and Aileen Brock; RJC – R.J. Cannings; SGC – S.G. Cannings; DBD – D.B. Donald; CSG – C.S. Guppy; LM – L. Moore [Vasington]; RM – R. Moore.

Bolshecapnia milami (Nebeker and Gaufin)

Manning Provincial Park, Similkameen R., near park headquarters, 1190 m, 11.ii.1976 (SGC), 19.iii.1982 (SGC); MPP, Similkameen R. at Chuwanten Cr., 1190 m, 1.iii.1981 (SGC).

These are the first records for British Columbia; this species was previously known from the Rocky Mountains of Alberta and northern United States (Donald and Anderson 1977, Baumann *et al.* 1977).

B. sasquatchi (Ricker)

MPP, Similkameen R., Cambie Cr. ski area, 1350 m, 19.iii.1983 (SGC); MPP, Skagit R., 838 m, 18.ii.1983 (SGC).

Capnia cheama Ricker

Bulkley R., Smithers, 19.iv.1989 (D. Weir); Sedan Cr., 10 km W of Kitwanga, 6.iv.1989 (D. Weir); Skeena R., 5 km W of Kitwanga, 2.iv.1989 (D. Weir).

These records fill in a huge gap between the type locality near Chilliwack, B.C. and a record from Rampart House in the northern Yukon (specimens in Canadian National Collection, Ottawa). This rare species of large streams and rivers is also known from the Rocky Mountains of Alberta and Montana (Baumann *et al.* 1977).

Capnia coloradensis Claassen

Kelsall L. area, Haines Road, 28.iv.1981 (S. Hannon), 2.v.1982 (M. Taitt); MPP, Similkameen R., at Chuwanten Cr., 1.iii.1981 (SGC); MPP, Similkameen R., near park headquarters, 1190 m, 11.ii.1976 (SGC), 16.iii.1980 (RJC), 14.ii.1982 (SGC), 19.iii.1982 (SGC); Shingle Cr., 21.iii.1982 (SGC); Similkameen R., Princeton, 19.iii.1982 (SGC); Similkameen R., 2 km below Similkameen Falls, 20.ii.1982 (SGC), 19.iii.1982 (SGC); Skeena R., 5 km W of Kitwanga, 22.iii.1989 (D. Weir).

These are the first records for British Columbia, and extend the known distribution into the Coast and Cascade Mountains for the entire length of the province. Baumann *et al.* (1977) give the range as the Rocky Mountains of the United States, and Flannagan and Cobb (1983) extended it as far east as Manitoba on the Canadian Great Plains.

C. elongata Claassen

Mamquam R., 1.6 km upstream of Squamish R., 4.ii.1979 (SGC).

C. gracilaria Claassen

Ellis Cr., Penticton, 10.iii.1985 (J.A. Garland); Garibaldi Provincial Park, Garibaldi L., 1.vii.1976 (K. Cehak), 13.vi.1981 (SGC); Keremeos Cr., 15.vii.1976 (SGC); MPP, Similkameen R. near park headquarters, 16.iii.1980 (RJC), 14.ii.1982 (SGC, R&LM), 19.iii.1982 (SGC), 19.iii.1983 (SGC), 6.iii.1983 (SGC); *ibid.*, 1250 m (first bridge south of pass), 6.iii.1983; *ibid.*, Cambie Cr. ski area, 1350 m, 19.iii.1983 (SGC); *ibid.*, 24.iii.1984 (H&AB); *ibid.*, 2.iv.1989 (SGC, H&AB); MPP, Sumallo R., 14.iii.1982 (SGC), 19.iii.1982 (SGC); Penticton Cr., 21.iii.1982 (SGC); Shatford Cr., 21.iii.1982 (SGC); Shingle Cr., 21.iii.1982 (SGC); Similkameen R., Princeton, 19.iii.1982 (SGC); Similkameen R., 2 km below Similkameen Falls, 19.iii.1982 (SGC), Skeena R., 5 km W of Kitwanga, 22.iii.1989 (D. Weir), 2.iv.1989 (D. Weir).

After *C. nana*, this is probably the commonest montane *Capnia* in British Columbia. Although these records are all from the southern end of the province, *C. gracilaria* is also common in the southern Yukon (unpublished data), so it is undoubtedly widely distributed in British Columbia. Baumann *et al.* (1977) give its range as the Coast, Cascade and Rocky Mountains and the Northern Great Plains; in Canada it reaches as far east as Manitoba (Flannagan and Cobb 1983).

C. melia Frison

Botanie L., Lytton, beside creek, 1067 m, 31.iii.1983 (CSG); Cypress Provincial Park, 13.iii.1982 (SGC); Garibaldi Provincial Park, Diamond Head Trail, 1067-1372 m, 5.iv.1981 (SGC), 17.iv.1981 (SGC); Keremeos Cr., 15.ii.1976 (SGC); MPP, Fat Dog Cr., 28.iv.1985, H&AB; MPP, Similkameen R., near park headquarters, 14.ii.1982 (SGC, R&LM); 19.iii.1982 (SGC), 6.iii.1983 (SGC), 19.iii.1983 (SGC); MPP, Similkameen R., "Cambie Cr." ski area, 2.iv.1989 (SGC); MPP, Sumallo R., 14.ii.1982 (SGC).

C. nana Claassen

Botanie L., Lytton, beside creek, 1067 m, 31.iii.1983 (CSG); Cypress Provincial Park, 1000 m, 4.iv.1980 (RJC); Ellis Cr., Penticton, 10.iii.1985 (J.A. Garland); Glacier National Park, Loop Brook, 1170 m, 18.iv.1980 (J.G. Woods); Keremeos Cr., 15.ii.1975 (SGC); MPP, Castle Cr., 11.ii.1979 (SGC), 14.ii.1982 (SGC); MPP, Chuwanten Cr., 1.iii.1981 (SGC, R&LM), 14.ii.1982 (SGC); MPP, Fat Dog Cr., 6.iii.1983 (SGC), 19.iii.1983 (SGC), 28.iv.1985 (H&AB); MPP, Fat Dog Cr., upper headwaters, 1524-1830 m, 28.ii.1981 (SGC); Flash L. and "Flash Cr.", 18.ii.1983 (SGC); MPP, Monument 83 Trail, 1220-1372 m, 1.iii.1981 (SGC, LM); MPP, Similkameen R., 17.ii.1983 (SGC); *ibid.*, "Cambie Cr." ski area, 1350 m, 16.ii.1980 (SGC), 16.iii.1980 (SGC), 14.iii.1981 (C. Edman), 15.iii.1981 (C. Edman), 19.iii.1983 (SGC), 24.iii.1984 (H&AB), 2.iv.1989 (SGC, H&AB); *ibid.*, 1400-1450 m, 19.iii.1983 (SGC); MPP, Similkameen R., at Chuwanten Cr., 17.ii.1980 (SGC), 1.iii.1981 (SGC); *ibid.*, near park headquarters, 1190 m, 16.ii.1976 (SGC), 11.ii.1979 (SGC), 16.iii.1980 (RJC), 14.ii.1982 (SGC, R&LM), 19.iii.1982 (SGC), 6.iii.1983 (SGC), 19.iii.1983 (SGC); *ibid.* near confluence of Pasayten R., 20.ii.1982 (SGC); *ibid.*, 1250 m, first bridge south of Allison Pass, 6.iii.1983 (SGC); Paulson Summit, near Castlegar, 26.ii.1982 (P. Wood); Shingle Cr., Penticton, 21.iii.1982 (SGC); Skeena R., 5 km W of Kitwanga, 2.iv.1989 (D. Weir); Wells Gray Provincial Park, Blackwater Cr., 701 m, 24.ii.1985 (T. Goward); Wells Gray Provincial Park, McLeod Hill, 853 m, 16.iii.1985 (T. Goward).

This is by far the most abundant capniid of small mountain streams in British Columbia; the fact that Ricker and Scudder (1975) report only three previous records is an indication that few entomologists have collected in the mountains in the early spring.

C. petila Jewett

Botanie L., Lytton, beside creek, 1067 m, 31.iii.1983 (CSG); MPP, Similkameen R., "Cambie Cr." ski area, 24.iii.1984 (H&AB), 2.iv.1989 (SGC, H&AB), Skeena R., 5 km W of Kitwanga, 22.iii.1989 (D. Weir); 2.iv.1989 (D. Weir).

These are the first records for British Columbia. This is a relatively rare species, but is widely distributed in the Western Cordillera. Baumann *et al.* (1977) give the range as the Cascade and Rocky Mountains (north to Banff) and recent unpublished records from the southwestern Yukon extend the range throughout British Columbia. It appears to emerge later than *C. nana* and other, more common, congeners.

C. sextuberculata Jewett

Botanie L., Lytton, beside creek, 1067 m, 31.iii.1983 (CSG).

This is the first record for British Columbia; previously recorded from the Cascade Mountains of Oregon and the Rocky Mountains of Alberta and Montana (Baumann *et al.* 1977).

Isocapnia spenceri Ricker

Atnarko R., spawning channel near Stue, 11.iv.1989 (M. Wigle).

Mesocapnia autumnata (Baumann and Gaufin)

Similkameen R., Keremeos, 9.x.1982 (SGC); Similkameen R., Princeton, 11.x.1982 (SGC).

Mesocapnia oenone (Neave)

Elk Lake Provincial Park, lower Elk Lake, 1735 m, 28.viii.1977 (DBD); MPP, Similkameen R., near park headquarters, 1190 m, 12.x.1981 (SGC); Hamber Provincial Park, Fortress L., 1337 m, 26.ix.1979 (DBD).

Utacapnia columbiana (Claassen)

Atlin L., Warm Bay, found dead in *Picea* sap, 22.vi.1982 (SGC); Bulkley R., Smithers, 19.iv.1989 (D. Weir); Sedan Cr., 10 km W of Kitwanga, 6.iv.1989 (D. Weir); Skeena R., 5 km W of Kitwanga, 22.iii.1989 (D. Weir); 2.iv.1989 (D. Weir); Tetsa R., campground on Alaska Highway, 16.vi.1982 (SGC).

U. trava (Nebeker and Gaufin)

Akolkolex Cr., at Columbia R., 460 m, 24.ii.1980 (J.G. Woods); Beatty L., 31.vii.1977 (DBD); MPP, Lightning Lakes, beside open section of lake, 1220 m, 18.ii.1983 (SGC); MPP, Similkameen R., at Chuwanten Cr., 1.iii.1981 (SGC); *ibid.*, near park headquarters, 1190 m, 11.ii.1979 (SGC), 14.ii.1982 (SGC, R&LM), 6.iii.1983 (SGC); *ibid.*, near Pasayten R., 20.ii.1982 (SGC); Mount Robson Provincial Park, Kinney L., 985 m, 9.vi.1979 (DBD); Mount Robson Provincial Park, Yellowhead Lake, 1104 m, 23.v.1976 (DBD); Similkameen R., at Bromley Provincial Park, 19.iii.1982 (SGC); *ibid.*, Keremeos, 19.iii.1982 (SGC); *ibid.*, Princeton, 19.iii.1982 (SGC); *ibid.*, 2 km below Similkameen Falls, 20.ii.1982, 19.iii.1982 (SGC).

These are the first detailed records for the province, although Donald and Anderson (1980) and Donald and Patriquin (1983) used British Columbia records in analyses of lentic stoneflies. These records extend the known distribution into the Cascade Mountains. Baumann *et al.* (1977) give the range as the Canadian and Northern Rocky Mountains (north to Banff); Dossdall and Lemkuhl (1979) and Flannagan and Cobb (1983) extended it onto the Canadian Great Plains.

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REFERENCES

- Baumann, R.W., A.R. Gaufin and R.F. Surdick. 1977. The stoneflies (Plecoptera) of the Rocky Mountains. Mem. Am. ent. Soc. (Philadelphia) 31. 208 pp.
- Donald, D.B. and R.S. Anderson. 1980. The lentic stoneflies (Plecoptera) from the Continental Divide region of southwestern Canada. Can. Ent. 112:753-758.
- Donald, D.B. and D.E. Patriquin. 1983. The wing length of lentic Capniidae (Plecoptera) and its relationship to elevation and Wisconsin glaciation. Can. Ent. 115:921-926.
- Dossdall, L. and D.M. Lemkuhl. 1979. Stoneflies (Plecoptera) of Saskatchewan. Quaest. Ent. 15:3-116.
- Flannagan, J.F. and D.G. Cobb. 1983. New records of winter stoneflies (Plecoptera) from Manitoba with notes on their zoogeographical origins. Can. Ent. 115:673-677.
- Ricker, W.E. 1943. Stoneflies of southwestern British Columbia. Indiana University Publications, Science Series 12:1-145.
- Ricker, W.E. and G.G.E. Scudder. 1975. An annotated checklist of the Plecoptera (Insecta) of British Columbia. Syesis 8:333-348.
- Zwick, P. 1973. Insecta: Plecoptera, Phylogenetisches System und Katalog. Das Tierreich 94:1-465.

CHALCIDOIDS (HYMENOPTERA) REARED FROM *ARTEMISIA TRIDENTATA* (ASTERACEAE) GALLS IN BRITISH COLUMBIA, CANADA

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While on a collecting trip in British Columbia (Canada), I took 39 stem galls from sagebrush, *Artemisia tridentata* (Nuttall) (Asteraceae). Four chalcidoid spp. (Hymenoptera) emerged from the galls, representing four families. This paper reports the times of emergence after collection, diameter and location of exit holes and wasp's lifespans.

The galls were collected along a roadside, 15 kms NW of Lower Nicola, B.C., on 22 June 1988 and placed in 35 ml plastic cups. The ovate galls were located mostly on the basal two-thirds of the shoots. Sixteen of the reared galls (41%) produced chalcidoids. The galls, which were kept at room temperature were observed daily and were not moistened, to prevent the